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Application Serial No. 10/581,874   PATENT
Reply to office action of March 3, 2009   Docket: CU-4836

Amendments To The Claims

The listing of claims presented below will replace all prior versions, and listings,
of claims in the application.

Listing of claims:

1.   **(currently amended)** An image compression system comprising:

a processor and a memory, the memory having stored thereon:

an image segmentation unit for **receiving and** segmenting ~~an~~ **a panoramic**
image into a plurality of sub-images;

a first encoding unit for encoding the sub-images to output sub-image bitstreams;

a BMAP (bitstream map) construction unit for calculating the quantity of
information on each sub-image bitstream and generating BMAP information using the
calculated quantity of information and information on construction of each sub-image;
~~and~~

a bitstream combining unit for combining the sub-image bitstreams and the
BMAP information **to produce a bit stream**.

2.   (original) The image compression system as claimed in claim 1, further
comprising a binarization unit for binarizing the BMAP information generated by the
BMAP construction unit and outputting the binarized BMAP information to the bitstream
combining unit, the bitstream combining unit combining the sub-image bitstreams and
the binarized BMAP information.

Application Serial No. 10/581,874   PATENT
Reply to office action of March 3, 2009   Docket: CU-4836

3.   (original) The image compression system as claimed in claim 2, wherein the

binarization unit encodes the binarized BMAP information and outputs it.

4.   (original) The image compression system as claimed in claim 2, wherein the

binarization unit allocates a predetermined number of bits to the BMAP information and

outputs binary numbers corresponding to the BMAP information.

5.   (original) The image compression system as claimed in claim 2, wherein the

binarization unit carries out a unary arithmetic operation for the BMAP information.

6.   (original) The image compression system as claimed in claim 2, wherein the

binarization unit differential-pulse-code-modulates the BMAP information and binarizes

the differential pulse code modulation result.

7.   (original) The image compression system as claimed in claim 1, wherein the

bitstream combining unit combines the BMAP information with the head of the sub-

image bitstreams.

8.   (original) The image compression system as claimed in claim 1, wherein the first

encoding unit encodes the sub-images based on JPEG.

9.   **(currently amended)** An image compression system comprising:

       a processor and a memory, the memory having stored thereon:

a first encoding unit for **receiving and** encoding a base-layer **panoramic** image and outputting it as a first bitstream;

an image segmentation unit for segmenting an enhancement-layer image into a plurality of sub-images, and outputting them;

a second encoding unit for encoding the sub-images output by the image segmentation unit, and outputting them as a second bitstream;

a BMAP (bitstream map) construction unit for calculating an information amount of the second bitstream, using the information amount and configuration information of the sub-images, and generating BMAP information; and

a bitstream combining unit for combining the second bitstream and the BMAP information, and outputting combined data **as an enhanced layer bitstream**.

10.   (original) The image compression system as claimed in claim 9, further comprising:

a down sampling unit for down sampling the input image and outputting the down sampled image as the base-layer image;

an up sampling unit for up sampling the image generated by decoding the first bitstream, and outputting the up sampled image; and

a summing unit for outputting a difference between the input image and the image output by the up sampling unit to the enhancement layer image.

11.   (original) The image compression system as claimed in claim 9, wherein the second encoder performs interframe encoding.

12.   **(currently amended)** An image decoding system comprising:

a processor and a memory, the memory having stored thereon:

a bitstream receiving unit for receiving bitstreams of ~~an~~ **a panoramic** image

including a plurality of sub-images;

a BMAP reading unit for reading BMAP information included in the bitstreams

and outputting information on a sub-image to be decoded among the plurality of sub-

images;

a sub-image extracting unit for extracting a bitstream corresponding to the sub-

image to be decoded from the bitstreams using the information on the sub-image to be

decoded; and

a sub-image decoding unit for decoding the bitstream extracted by the sub-image

extracting unit **to produce a reconstructed panoramic image**.

13.   (original) The image decoding system as claimed in claim 12, wherein the BMAP

information includes information on construction of each sub-image and the quantity of

information of each sub-image bitstream.

14.   (original) The image decoding system as claimed in claim 12, further comprising

an interface unit for providing interface through which a user selects a region to be

decoded from the first image.

15.   (original) The image decoding system as claimed in claim 12, wherein the

information on the sub-image represents the position in the bitstreams of the first image,

which includes the bitstream of the sub-image to be decoded.

16.   **(currently amended)** An image decoding system comprising:

    a processor and a memory, the memory having stored thereon:

    a first decoding unit for **receiving and** decoding a bitstream of a base-layer

panoramic image, and outputting it;

    a BMAP reading unit for reading BMAP information included in the bitstream of

an enhancement image including a plurality of sub-images, and outputting information

of a sub-image to be decoded from among the sub-images;

    a sub-image extracting unit for using information on the sub-image to be

decoded, and extracting a bitstream which corresponds to the sub-image to be

decoded; and

    a second decoding unit for decoding the bitstream extracted by the sub-image

extracting unit, and outputting the decoded bitstream **as an enhanced layer bitstream**.

17.   (original) The image decoding system as claimed in claim 16, further comprising

an up-sampling unit for up-sampling the output image of the first decoding unit, and a

summing unit for summing up the image output from the up-sampling unit and the

image output from the second decoding unit.

18.   (original) The image decoding system as claimed in claim 16, wherein the

second decoding unit carries out interframe decoding.

19.   **(currently amended)** An image compressing method comprising:

providing a processor and a memory, the memory having stored thereon:

(a) **receiving and** segmenting the first **panoramic** image into a plurality of sub-

images;

(b) encoding the sub-images to generate sub-image bitstreams;

(c) calculating the quantity of information of each sub-image and generating

BMAP information using the calculated quantity of information and information on

construction of each sub-image;

(d) combining the sub-image bitstreams and the BMAP information to generate

frame bitstreams; and

(e) combining the frame bitstreams to form the bitstream of the input image **to**

produce a bit stream.

20.   (original) The image compression method as claimed in claim 19, wherein

encoding the sub-images to generate sub-image bitstreams comprises:

discrete-cosine-transforming the sub-images; quantizing the discrete-cosine-

transformed data; and

entropy-coding the quantized data.

21.   (original) The image compression method as claimed in claim 19, wherein

combining the sub-image bitstreams and the BMAP information to generate frame

bitstreams comprises binarizing the BMAP information and combining the binarized

BMAP information and the sub-image bitstreams.

22.   **(currently amended)** An image compression method comprising:

providing a processor and a memory, the memory having stored thereon:

(a) **receiving and** encoding a base-layer **panoramic** image and outputting it as a

first bitstream;

(b) segmenting an enhancement image into a plurality of sub-images;

(c) encoding the sub-images and outputting them as a second bitstream;

(d) calculating an information amount of the second bitstream, using the

information amount and configuration information of the sub-image, and generating

BMAP information;

(e) combining the bitstream of the sub-images and the BMAP information to

generate frame bitstreams; and

(f) combining the frame bitstreams, and outputting combined data **as an**

enhanced layer bitstream.

23.   (original) The image compression method as claimed in claim 22, further

comprising, before (a), down sampling the input image to generate the base-layer

image.

24.   (original) The image compression method as claimed in claim 23, further

comprising, after (a), outputting a difference between the input image after (a) and the

up sampled image generated by decoding the first bitstream to the enhancement image.

25.   **(currently amended)** An image decoding method comprising:

providing a processor and a memory, the memory having stored thereon:

receiving bitstreams of ~~an~~ **a panoramic** image including a plurality of sub-

images;

reading information on a sub-image corresponding to a region to be decoded

among the plurality of sub-images using BMAP information included in the bitstreams;

and

extracting a bitstream corresponding to the sub-image to be decoded from the

bitstreams **to produce a reconstructed panoramic image.**

26.   (original) The image decoding method as claimed in claim 25, wherein the

BMAP information includes information on construction of each sub-image and the

quantity of information of each sub-image bitstream.

27.   **(currently amended)** An image decoding method comprising:

providing a processor and a memory, the memory having stored thereon:

decoding a bitstream of a base-layer **panoramic** image, and outputting the

decoded bitstream;

using BMAP information included in a bitstream of an enhancement layer

including a plurality of sub-images, and reading information on a sub-image

corresponding to a region to be decoded from among the sub-images;

using information on the sub-image to be decoded, and extracting a bitstream

corresponding to the sub-image to be decoded from among the enhancement layer

image; and

decoding the extracted bitstream, and outputting the decoded bitstream **as an**

enhanced layer bitstream.

28.   (currently amended) A ~~recording medium~~ **computer-readable storage**

media storing ~~an~~ **panoramic** image compression program, comprising:

receiving ~~an~~ **panoramic** image including at least one frame;

segmenting the image into a plurality of sub-images;

encoding the sub-images to generate sub-image bitstreams;

calculating the quantity of information of each sub-image bitstream and

generating BMAP information using the calculated quantity of information and

information on construction of each sub-image; and

combining the sub-image bitstreams and BMAP information to generate frame

bitstreams.

29.   (original) The recording medium as claimed in claim 28 further comprising

combining the frame bitstreams to form the bitstream of the image when the image

includes multiple frames.

30.   (currently amended) A ~~recording medium~~ **computer-readable storage**

media storing ~~an~~ **panoramic** image decoding program, comprising:

receiving bitstreams including a plurality of sub-images;

Application Serial No. 10/581,874   PATENT
Reply to office action of March 3, 2009   Docket: CU-4836

reading information on a sub-image including a region to be decoded among the

plurality of sub-images using BMAP information included in the bitstreams; and

extracting a bitstream corresponding to the sub-image to be decoded from the

bitstreams.

31.   (original) The recording medium as claimed in claim 30, wherein the BMAP

information includes information on construction of each sub-image and the quantity of

information of each sub-image bitstream.